CLAIMS:

1. A fatigue degree measurement device, comprising:

a living body signal peak value detecting means for detecting the peak value in each cycle of an original waveform of the living body signal data collected by a living body signal measurement device;

a power value calculating means for calculating the difference between a peak value on the upper limit side and a peak value on the lower limit side for every prescribed time period from each peak value obtained by said living body signal peak value detecting means and for setting the difference as the power value;

a power value inclination calculating means for determining an inclination of said power values to the time base during the prescribed time period by slide calculating the prescribed times at a prescribed lap rate for the prescribed time period; and

a fatigue degree calculating means for calculating an integral value by absolute value treatment of time base signal of power value inclination obtained from the slide calculation by said power value inclination calculating means to determine the obtained integral value as the degree of fatigue.

2. The fatigue degree measurement device according to claim 1,

wherein said living body signal peak value detecting means is a means to perform smoothing differentiation of the living body signal data to determine the peak value on the upper limit side and the peak value on the lower limit side for the width fluctuation of the waveform with a

predetermined threshold value.

3. The fatigue degree measurement device according to claim 1,

wherein said power value calculating means is a means to calculate the difference between the mean value of the peak value on the upper limit side and the mean value of the peak value on the lower limit side within the prescribed time period range of the living body signal data as the power value.

4. The fatigue degree measurement device according to claim 3,

wherein said power value calculating means is a mean to calculate the square value of the difference between the mean value of the peak value on the upper limit side and the mean value of the peak value on the lower limit side within the prescribed time period range of the living body signal data as the power value.

5. The fatigue degree measurement device according to claim 1,

wherein the time interval used in the slide calculation in said power value inclination calculating means is 180 seconds and the lap rate is 90%.

6. The fatigue degree measurement device according to claim 1, further comprising:

a maximum Lyapunov index calculating means for calculating the maximum Lyapunov index by chaos analyzing said living body signal data;

a maximum Lyapunov index peak value detecting means for detecting the peak value in each cycle of a time series change waveform of the calculated maximum Lyapunov index;

a maximum Lyapunov index inclination calculating means for determining an inclination of each peak value of the maximum Lyapunov indexes obtained by the maximum Lyapunov index peak value detecting means to the time base during the prescribed time period by slide calculating the prescribed times at a prescribed lap rate for the prescribed time period, in addition to said inclination of the power value; and

a comparing and determining means for determining as the generating point of a fatigue signal when the inclination of the power value obtained by slide calculating using said power value inclination calculating means and the maximum Lyapunov index obtained by slide calculating using the maximum Lyapunov index inclination calculating means stably show the phase difference of substantially 180° among time series signals.

7. The fatigue degree measurement device according to claim 6,

wherein said maximum Lyapunov index peak value detecting means is a means to perform smoothing differentiation of the time series change waveform of the maximum Lyanopunov index to determine the peak value on the upper limit side and the peak value on the lower limit side for the width fluctuation of the waveform with a predetermined threshold value.

8. The fatigue degree measurement device according to claim 6,

wherein the time interval used in the slide calculation in said maximum Lyapunov index inclination calculating means is 180 seconds and the lap rate is 90%.

9. A fatigue detection device, comprising:

a living body signal peak value detecting means for detecting the peak value in each cycle of an original waveform of the living body signal data collected by a living body signal measurement device;

a power value calculating means for calculating the difference between a peak value on the upper limit side and a peak value on the lower limit side for every prescribed time period from each peak value obtained by said living body signal peak value detecting means and for setting the difference as the power value;

a power value inclination calculating means for determining an inclination of said power values to the time base during the prescribed time period by slide calculating the prescribed times at a prescribed lap rate for the prescribed time period;

a maximum Lyapunov index calculating means for calculating the maximum Lyapunov index by chaos analyzing said living body signal data;

a maximum Lyapunov index peak value detecting means for detecting the peak value in each cycle of a time series change waveform of the calculated maximum Lyapunov index;

a maximum Lyapunov index inclination calculating means for determining an inclination of each peak value of the maximum Lyapunov indexes obtained by said maximum Lyapunov index peak value detecting means to the time base during the prescribed time period by slide calculating the prescribed times at a prescribed lap rate for the prescribed time period; and

a comparing and determining means for determining as the generating point of a fatigue signal when the inclination of the power value obtained by slide calculating using said power value inclination calculating means and the

maximum Lyapunov index obtained by slide calculating using said maximum Lyapunov index inclination calculating means stably show the phase difference of substantially 180° among time series signals.

10. The fatigue detection device according to claim 9,

wherein said living body signal peak value detecting means is a means to perform smoothing differentiation of the living body signal data to determine the peak value on the upper limit side and the peak value on the lower limit side for the width fluctuation of the waveform with a predetermined threshold value, and said maximum Lyapunov index peak value detecting means is a means to perform smoothing differentiation of the time series change waveform of the maximum Lyanopunov index to determine the peak value on the upper limit side and the peak value on the lower limit side for the width fluctuation of the waveform with a predetermined threshold value.

11. The fatigue detecting measurement device according to claim 9,

wherein the time interval used in the slide calculation in said power value inclination calculating means and said maximum Lyapunov index inclination calculating means is 180 seconds and the lap rate is 90%.

12. The fatigue detection device according to claim 9,

wherein said comparing and determining means includes a fatigue state determining means for determining the state of fatigue based on the inclinations of power value and the maximum Lyapunov index appearing in time series.

13. The fatigue detection device according to claim 12,

wherein said fatigue state determining means includes a means to perform frequency analysis of the change in the inclinations of power value and the maximum Lyapunov index appeared in time series, and determines a central fatigue predominant state when the power spectrum of the inclination of the maximum Lyapunov index is large, and a peripheral fatigue predominant state when the power spectrum of the inclination of the power value is large.

14. A computer program to make a computer execute a process to measure the degree of fatigue by analyzing the living body signal data collected by a living body signal measurement device to measure a human living body signal, comprising:

a living body signal peak value detecting step of detecting the each cycle peak value of the original waveform of said living body signal data;

a power value calculating step of calculating the difference between a peak value on the upper limit side and a peak value on the lower limit side for every prescribed time period from each peak value obtained from said living body signal peak value detecting step to set the difference as the power value;

a power value inclination calculating step of determining the inclination of said power value to the time base during the prescribed time period by slide calculating the prescribed times at a prescribed lap rate for the prescribed time period; and

a fatigue degree calculating step of calculating an integral value by absolute value treatment of the time base signal of the power value

inclination obtained from slide calculation by said power value inclination calculating step to determine the obtained integral value as the degree of fatigue.

15. A computer program to make the computer execute a process to detect fatigue by analyzing the living body signal data collected by a living body signal measurement device to measure a human living body signal, comprising:

a living body signal peak value detecting step of detecting the peak value in each cycle of the original waveform of the living body signal data collected by a living body signal measurement device;

a power value calculating step of calculating the difference between a peak value on the upper limit side and a peak value on the lower limit side for every prescribed time period from each peak value obtained from said living body signal peak value detecting means to set the difference as the power value;

a power value inclination calculating step of determining the inclination of the power value to the time base during the prescribed time period by slide calculating the prescribed times at a prescribed lap rate for the prescribed time period;

a maximum Lyapunov index calculating step of calculating the maximum Lyapunov index by chaos analyzing said living body signal data;

a maximum Lyapunov index peak value detecting step of detecting the peak value in each cycle of a time series change waveform of the calculated maximum Lyapunov index;

a maximum Lyapunov index inclination calculating step of

determining the inclination of each peak value of the maximum Lyapunov indexes obtained by said maximum Lyapunov index peak value detecting step to the time base during the prescribed time period by slide calculating the prescribed times at a prescribed lap rate for the prescribed time period, and

comparing and determining step of determining as the generating point of a fatigue signal when inclination of the power value obtained by slide calculating using said power value inclination calculating step and the maximum Lyapunov index obtained by slide calculating using said maximum Lyapunov index inclination calculating step stably show the phase difference of substantially 180° among time series signals.

16. The computer program according to claim 15,

wherein said comparing and determining step includes a fatigue state determining step to perform frequency analysis of the change in inclination of the power value and of the maximum Lyapunov index appearing in time series, and determines to be a central fatigue predominant state when the power spectrum of the inclination of the maximum Lyapunov index is large, and to be a peripheral fatigue predominant state when the power spectrum of the inclination of the power value is large.